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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,669	09/18/2003	David J. Alcoe	END920010135US2	8575
7590	03/23/2005		EXAMINER	
Schmieser, Olsen & Watts 3 Lear Jet Lane, Suit 201 Latham, NY 12110			LE, THAO X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/665,669

Applicant(s)

ALCOE ET AL.

Examiner

Thao X. Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-17 and 21-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-17 and 21-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 23-32 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation 'first coefficient of thermal expansion between about 25% to about 700% of second coefficient of thermal expansion' is not originally disclosed in the specification.

For the purpose of the examination assuming 'the second coefficient of thermal expansion between about 25% to about 700% of first coefficient of thermal expansion'.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 10-13, 14-17, 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6637506 to Gektin et al. in view of US 5880524 to Xie

Regarding claim 10, Gektin discloses a method for dissipating heat from an electronic package having one or more components in fig. 1A-3 comprising: providing a substrate 102, column 3 line 8, having a first coefficient of thermal expansion (CTE); attaching a lid 106, column 3 line 9, to said substrate 102, the lid 106 having a second CTE; the second CTE about equal to the first CTE (the lid or heat spreader as explained in fig. 2 having a perimeter portion 204 comprises SiC or AlSiC, column 4 line 39, having a CTE compatible to the substrate, column 5 lines 55-56); providing a solid thermal transfer medium 108, column 3 line 9, in direct contact with a back surface of each component 104, column 3 line 9, and an outer surface of a lower wall, fig. 1A, mounting each component 104 directly to the top surface of the substrate 102, fig. 1A; and electrically connecting each component to a top surface of said substrate 102, fig. 1A.

But Gektin does not disclose the lid 106 including a chamber vapor.

However, Xie discloses an electronic package in fig. 1A comprising a substrate 102, an IC 106, a lid 104 having a chamber vapor 120. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the vapor chamber teaching of Xie with the lid 106 of Gektin, because it would have reduced the heat flux at the surface of high power semiconductor package as taught by Xie in column 1 lines 55-57.

Regarding claim 11, Gektin discloses the method of claim 10, wherein an upper wall (center portion 202 of the heat spreader as explained in fig. 2 column 3 line 49 comprises Cu, Al, Ag, Au, column 4 line 35) of the lid 106 has second CTE, the lower wall (perimeter portion 204 comprises SiC, AlSiC, fig. 2, column 4 line 39) of said lid 104 has a third CTE, column 4 line 39, and said components 104 have a fourth CTE, the third CTE is about equal to the fourth CTE, column 5 lines 55-56, and the second CTE different from the third CTE. The different materials between the center and perimeter portion would have different CTE.

Regarding claim 12, Gektin discloses the method of claim 10, further including: mounting a heat sink 110, column 3 line 13, having a third CTE to an outer surface of a top wall of lid 106, fig. 1A, the third CTE between about 25% and about 700% of the coefficient of expansion to said second CTE (both heat sink 110 and center portion 202 of heat spreader have similar material, column 3 line 14 and column 4 line 35, thus the CTE of heat sink would read on the claim limitation).

Regarding claim 14, Gektin does not disclose the method further including providing supports within said vapor chamber between an upper wall of said vapor chamber and said lower wall, some or all of said supports aligned over some or all of said components.

But Xie discloses the method wherein including providing supports 126, fig. 1A, within said vapor chamber 120 between an upper wall 122, fig 1A, of said vapor chamber 120 and said lower wall 132, some or all of said supports aligned over some or all of said components 106. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the vapor chamber having support member teaching of Xie with Gektin's device, because it would have reduced the heat flux at the surface of high power semiconductor package as taught by Xie in column 1 lines 55-57 and structural support as taught by Xie in column 4 lines 6-12.

Regarding claim 15, Gektin discloses the method of claim 10, wherein said package is selected from the group consisting of ball grid array modules, pin grid array modules, land grid array modules and HyterBGA modules, see filed of invention, such substrate package is generally known as PGA or flip chip, see Xie in column 2 lines 40-41.

Regarding claim 16, Gektin discloses the method of claim 10, wherein said lid 106 is formed from material selected from the group consisting of aluminum, copper, Invar, gold, silver, nickel, aluminum-silicon carbide, plastics, ceramics and composites, column 4 line 35 and 39.

Regarding claim 17, Gektin discloses the substrate includes material selected from the group consisting of ceramics, column 4 line 38. The perimeter 204 has CTE compatible with the die and/or substrate; thus Gektin would imply the substrate and the perimeter having the same material. In addition, the ceramic substrate used in PGA or BGA is conventional in the art; see Hsiung (6590409) in column 6 lines 20-25 and Daves (6292369) in column 6 lines 14-17.

Regarding claim 21, Gektin discloses the method wherein the lower wall (center portion) of the lid is formed from different material than the sidewalls and an upper of the lid (perimeter portion), column 4 lines 34-39.

Regarding claim 22, Gektin discloses the method wherein an upper wall (top surface) of the lid 106 has second CTE, the lower wall (bottom surface) of the lid has a third CTE, each component 104 has a fourth CTE and the third CTE between about 50% to about 700% of fourth CTE. The component IC 104 would comprises silicon while the lid comprises Cu or Al. Therefore, the CTE of either Cu or Al would be higher than that of Si. This is the inherent property of the material.

Regarding claim 23-27, 29-32 see discussion the claims 10-12, 14-17 and 21-22 above

6. Claims 13, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6637506 to Gektin et al. US 5880524 to Xie in view of US 5933323 to Bhatia et al.

Regarding claims 13 and 28, Gektin does not discloses the method of claim 10, wherein said lower wall of said lid has protruding regions for maintaining equivalent

contact with said thermal transfer medium on thin components of said components as is maintained by thin regions on thick components of said components.

But Bhatia discloses the method in fig. 5 wherein said lower wall of said lid 510, column 6 line 13, has protruding region (portion in contact with 520) for maintaining equivalent contact with said thermal transfer medium on thin components 520 of said one or more components as is maintained by thin regions on thick components 522 of said one or more components. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the lid having a protruding portion teaching of Bhatia with Gektin's method, because it would have provided a good thermal dissipation for the IC having different heights as taught by Bhatia, column 6 lines 34-40.

### ***Response to Arguments***

7. Applicant's arguments filed on 31 Jan 2005 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

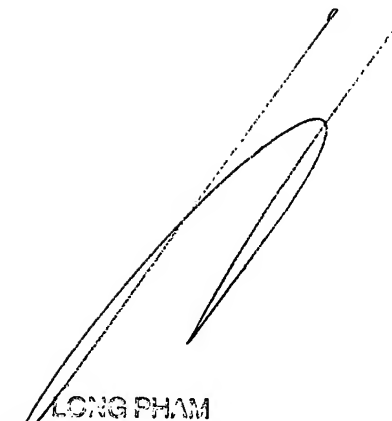
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Thao X. Le  
15 Mar. 2005



LONG PHAM  
PRIMARY EXAMINER